U.S. FISH AND WILDLIFE SERVICE - SPOTLIGHT SPECIES ACTION PLAN

Common Name: Sentry milk-vetch

Scientific Name: *Astragalus cremnophylax* var. *cremnophylax*

Lead Region: Region 2

Lead Field Office: Arizona Ecological Services Field Office

Species Information:

Status: Endangered

Recovery Priority Number: 6 (Recovery Priority #)

Recovery Plan: Sentry Milk-vetch (*Astragalus cremnophylax* var. *cremnophylax*) Recovery Plan. September 2006.

Most Recent 5-year Review: Completed April 22, 2009.

Other: Final listing rule December 12, 1990 (55 FR 50184-50187)

Threats: There are two populations of this species (Maricopa and Lollipop Points), both within the boundaries of Grand Canyon National Park (Park). There is one additional location (Grandview) in the Park, but there are only 3-4 individuals present and it may not represent a viable population. The Maricopa Point population (the largest population) was discovered in 1903; the Lollipop Point population was not found until 2002. Significant threats to this species at the time of listing in 1990 were trampling, and habitat fragmentation and degradation associated with tourist visitation to Maricopa Point. Before 1990 (when the Maricopa Point population was fenced), thousands of visitors walked on and through the population to access views of the South Rim of the canyon. The Park had also constructed a paved trail (a portion of the West Rim trail) through sentry milk-vetch habitat to allow visitors access to the canyon. The portion of the trail impacting the Sentry milk-vetch was removed in 1990, when an enclosure fence was constructed. Since fencing, the Maricopa Point population has recovered (slowly). There have been years when seedlings were observed, but virtually no recruitment has occurred at Maricopa Point since 2004. The ongoing drought has likely played a role in the reduced seed germination and low seedling survival. While the threat of trampling has been taken care of by fencing and removal of the paved trail, the Maricopa Point population is currently experiencing reduced reproductive output and mortality exceeds recruitment.

Other threats to the species include periodic damage to plants from herbivores rooting up plants or digging in occupied habitat (rock squirrels and bighorn sheep), effects to the habitat from fire (natural and prescribed burns) that could lead to increased erosion

within occupied habitat and mortality of plants, ongoing drought since the late 1990s which may be caused by climate change effects resulting in changes in moisture patterns on the Colorado plateau, and reduced genetic vigor in the populations. Genetic studies conducted by Allphin et al. (2005) demonstrated that the plants at Maricopa Point are suffering from inbreeding depression. Inbreeding depression can have serious consequences for small, isolated populations because recessive, lethal alleles may be expressed more often in the homozygous state, resulting in reduced reproductive vigor (Maricopa Point plants are poor reproducers). The Maricopa Point and Grandview plants have very low levels of genetic diversity. Allphin et al. (2005) hypothesized that the plants at Maricopa Point underwent a bottleneck event, likely from visitor trampling before the fence was built to protect the population. In any event, the low levels of genetic diversity coupled with low fecundity, reduced seed viability, and small population size increases the extinction risk; the populations may not have the genetic resources to withstand the effects of long-term drought or other man-made disturbances that may affect the populations.

Target: The 5-year target will move the species closer to the downlisting goal and the overall conservation status of the species will improve.

The recovery plan calls for the establishment, maintenance, and protection of four viable populations of 1,000 individuals each for a total of at least 4,000 plants in the wild. Each population must be stable or increasing over a ten-year period. The maintenance and augmentation of the existing populations, along with the creation of an additional population will reduce the threat of extinction and improve the conservation status for Sentry milk-vetch. This effort will require experimentation with different planting techniques, as there are no established protocols for the creation and establishment of Sentry milk-vetch populations. This work will take place in areas adjacent to Maricopa Point because there is ready access for equipment, water, and personnel. The goal is ambitious, but necessary to address the extinction risk to the extant populations. The techniques employed in this effort will form the foundation for future population augmentation/establishments (i.e. at Lollipop Point) in order to fully meet the downlisting criteria.

Measures:

Augment the existing population at Maricopa, with a population goal of 1,000 plants.

One new population of Sentry Milk-vetch will be established, with a population goal of 1,000 plants.

Additional suitable habitat will be delineated and 30 miles of new surveys will be conducted. Any new populations that are found will be protected.

If successful, the Recovery Priority Number (RPN) could change to 3 or 9. Specifically the recovery potential should increase and the degree of threat should be reduced if existing and additional populations can be managed for higher densities and long-term

population stability. Currently, the RPN is 6, indicating a high degree of threat with a low recovery potential.

Actions: The following actions, taken from the Sentry Milk-Vetch Recovery Plan, must be implemented over the next 5 years (2010-2014) to meet the species target.

Action	Description	Threat/Listing Factor Addressed	Responsible Parties	Cost (dollars)
1.3: Conduct surveys	Summarize, compile, map existing surveys and delineate areas for future survey work. Complete 30 miles of new surveys in the Park.	Factors A and E.	Park	48,000
1.4: Increase number of individuals in Maricopa Point population	Seed augmentation and possible transplanting of plants into existing population.	Factors A and E.	Park, U.S. Fish and Wildlife Service, Arboretum at Flagstaff, and researchers.	100,000
1:5:1, 1:5.2, 1.5.3. 1.5.4: Establish new population	Establish new population in suitable areas near Maricopa Point	Factor E	Park, USFWS, Arboretum at Flagstaff, and researchers.	120,000
2.2: Education	A new educational sign at the Maricopa population, along with educational materials on display in the Visitor Center and on the	Factor B	Park	10,000

	Park's website.			
5.3.3: Study the ecology of the species	Pollination study	Factor E	Park, Arboretum at Flagstaff, researchers.	50,000
5.4.1: Establish and maintain seed bank	Maintenance of existing seed bank at Arboretum at Flagstaff; continued seed collection in Park.	Factor E	Park, U.S. Fish and Wildlife Service, Center for Plant Conservation, and the Arboretum at Flagstaff.	40,000

Role of other agencies: The recovery of this species will require the continued cooperation of the National Park Service. Presently, they are the land managers of the entire range of the species. The Park is committed to the management and securing the long-term future of this species. As such, they wish to increase the visibility and provide new materials to further educate the public about the conservation needs of Sentry milk-vetch. A new sign will be designed and placed near the Maricopa Point population, with additional educational material (artwork, brochures, and Park Site Bulletins) displayed in the Visitor Center, and on the Park's website. In addition, systematic surveys for this species have not been undertaken at the Park. To date, surveys in the Park have been project-driven. The Park will consolidate and summarize all the surveys to date (including surveyed areas with negative results), and delineate other areas that seem suitable for the species (i.e. areas along the South Rim west of Hermit's Rest). The Park anticipates surveying an additional 30 miles during this 5-year period. Newly discovered populations will reduce the need to establish populations.

But, the total responsibility for recovery does not rest on them. The U.S. Fish and Wildlife Service (USFWS) will continue to work with its partners at the Arboretum of Flagstaff, and the Center for Plant Conservation for seed banking, seed germination, and ecological studies (i.e. the on-going pollinator study) that are critical to the management, augmentation, and establishment program for Sentry milk-vetch. The Park has well-established relationships with Northern Arizona University (NU) in Flagstaff, Arizona. Researchers and student interns (Student Conservation Association and NAU students) will be essential for completing ecological studies and assisting with the introduction effort. The Park has also acquired funds through their national and local internal programs to support the conservation and recovery effort.

Role of other ESA programs: The Park will continue to consult on projects that may affect Sentry milk-vetch. The Grandview location and the Lollipop population were discovered based on survey work associated with Park projects. The recent removal of the Maricopa Point parking lot and rerouting of a portion of the West Rim Trail away from the population are examples of other conservation actions achieved through section

7 consultations. Another action within the 5-year life of this plan will include the preparation and review of the backcountry management plan for the Park. Survey and location information of Sentry milk-vetch will be important elements for the long-term protection of existing and new sites. In addition, recovery actions for this species have been funded through section 6 grants. The initial seed collection and seed banking project with the Arboretum at Flagstaff, a mycorrhizal study of the species, the acquisition of a greenhouse for the Park for propagation of plants, and a pollination study are examples of recovery actions funded through our section 6 programs. National funds through the Recovery Budget Initiative (Showing Success/Preventing Extinction) are also available for on-the-ground-recovery actions. These funds may be crucial for achieving the targets for this species.

Role of other FWS programs: There has not been a defined role for other FWS programs because of the location of this species.

Additional funding analysis: The actions identified are only a sub-set of the recovery actions needed to delist the species. If additional funds are provided, additional survey work could be completed, along with additional population establishments. Additional studies will be needed to address questions of reduced seed viability and germination, including how these population factors may be exacerbated by climate change. A seed bank study may be needed to understand the dynamics of seed storage and germination requirements for this population. Companion studies will need to be done at the Lollipop Point populations as those plants seem healthier, produce more seed, and occupy a slightly different micro-habitat than plants at Maricopa Point. In addition, the Park has a position for Sentry milk-vetch recovery work for two more years. At that time, it is uncertain how the Park will continue with this work, except through the continued contributions of time and effort from the USFWS and the Arboretum at Flagstaff. The work outlined in the plan will require a full-time coordinator (best situated at the Park) in order to achieve the goals outlined.

Cooperator meeting:

On March 12, 2009, the USFWS met with staff from the Park and the Arboretum at Flagstaff to review this Action Plan. This final version was reviewed, edited, and approved by staff from the Park and the Arboretum.

Literature Cited:

Allphin, L., N. Brian, T. Matheson. 2005. Reproductive success and genetic divergence among varieties of the rare and endangered *Astragalus cremonphylax* var. *cremnophylax* (Fabaceae) from Arizona, USA. Conservation Genetics 6: 803-821.

Field Supervisor
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5/6/09
Date

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